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(Lepidoptera: Saturniidae)

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## Description of three new species of *Pseudautomeris* Lemaire, 1967 from Ecuador and Peru (Lepidoptera: Saturniidae)

L. Racheli & T. Racheli

### Abstract

This paper deals with the description of three new species belonging to the genus *Pseudautomeris*. These new taxa belong to the *salmonia* species-group (sensu LEMAIRE) which is unlikely monophyletic. One new species is described on the basis of two male specimens from San Martín department, northern Peru, stored in the collection of C. Lemaire (now in MNHN). The other two new species are described on the basis of male specimens from Zamora Chinchipe province, southeastern Ecuador, stored in SMNS. All these new species have been collected at medium elevations (~1800-2300 m) in different sites characterized by typical montane forests.

KEYWORDS: Lepidoptera, Saturniidae, *Pseudautomeris*, new species, Ecuador, Peru.

### Descripción de tres nuevas especies de *Pseudautomeris* Lemaire, 1967 de Ecuador y Perú (Lepidoptera: Saturniidae)

### Resumen

Este trabajo parte con la descripción de tres nuevas especies pertenecientes al género *Pseudautomeris*. Estas nuevas taxa pertenecen a las especies del grupo de *salmonia* (sensu LEMAIRE) las cuales son improbablemente monofiléticas. Se describe una nueva especie basándose en dos especímenes machos del departamento de San Martín, norte del Perú, conservados en la colección de C. Lemaire (ahora en el MNHN). Las otras dos nuevas especies se describen basándose en machos de Zamora, provincia de Chinchipe, sudeste de Ecuador, conservados en el SMNS. Todas estas tres nuevas especies, ha sido colectadas en elevaciones medias (~1.800-2.300 m) en diferentes lugares, caracterizados por ser típicos bosques de montaña.

PALABRAS CLAVE: Lepidoptera, Saturniidae, *Pseudautomeris*, nuevas especies, Ecuador, Perú.

### Introduction

According to LEMAIRE (2002), the genus *Pseudautomeris* contains 16 biological species subdivided into two main species-groups. The *salmonia* species-group includes at least nine different taxa (LEMAIRE, 2002), and an additional new species, *Pseudautomeris boettgeri*, recently described by NAUMANN, BROSCHE & WENCZEL (2005). However, the *salmonia* species-group as arranged by LEMAIRE (2002) does not seem a monophyletic group given that some of its constituent taxa are characterized by clear differences in internal and external morphology.

In the present paper, three new *Pseudautomeris* species are described on the basis of material from southeastern Ecuador and northern Peru. One of these new species from northern Peru was tentatively assigned by LEMAIRE (2002, pl. 71, fig. 8) to *P. antioquia* (Schaus, 1921). The other two new species are from southeastern Ecuador. In the recent updated checklist of the Ecuadorian Hemileucinae, RACHELI & RACHELI (2005: 215) listed an undetermined species of *Pseudautomeris* on the basis of a series of males from Zamora Chinchipe province. A most detailed comparison of these specimens re-

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vealed these two new undescribed species. According to their external morphology, one species is likely related to *P. pohli* Lemaire, 1967 whereas the other to *P. yourii* Lemaire, 1985.

#### Abbreviations used in the text

SMNS = Staatliches Museum für Naturkunde, Stuttgart, Germany; MNHN = Muséum National d'Histoire Naturelle, Paris, France; CL = collection Claude Lemaire (now in MNHN).

#### Description of new species

##### *Pseudautomeris chinchipensis* Racheli & Racheli, sp. n.

*Pseudautomeris yourii* Lemaire, 1985 [Partim] RACHELI & RACHELI, 2005

Holotype ♂ (Fig. 1): /Ecuador, Zamora-Chinchipe, Rio San Francisco, Estación Científica San Francisco, T1-5 (5), 2212 m, 3° 58' S 79° 04' W, 17-V-1999, LF V, 20.30-21.00 h, G. Brehm & D. Süßenbach leg.; SMNS – Lep. 1999 – 15/. Genit. Prep., L. Racheli, .N.-Code: PE6/; The holotype is deposited in SMNS.

Paratypes: 1 ♂, same data as holotype except for 19.30-20.00 h.; Genit. Prep., L. Racheli, N.-Code: PE1. The paratype is deposited in SMNS.

Description: Forewing length, 43 mm. Head brown. Antennae light brown. Legs brown and yellowish beige. Thorax: upperside brown, underside brown and light brown. The upperside area between the thorax and the abdomen is covered by a reddish pink suffusion and darker if compared with the pinkish ground colour of the hindwing upperside. Abdomen: upperside black with yellowish beige rings, underside yellowish beige.

Forewing upperside ground colour brown with a dark brown line from the apex to the inner margin which divides the postdiscal area from the submarginal area. Discal spot dark brown but not so evident, with whitish dots present in the centre.

Hindwing upperside entirely pink coloured with a brownish line dividing the margin from the submarginal area. The submarginal and postdiscal areas are separated by an irregular large brownish line and by a second irregular narrow black line. The eyespot is surrounded by a yellow line and by a second larger black line. The ground colour of the eyespot is dark grey, with two yellow lines. Within the eyespot, the pupil is characterized by a narrow white bow.

On the underside of forewing, an irregular black line from the costa to the inner margin separates the discal area from the postdiscal. The discal spot is black. The hindwing shows the same general features as those of the forewing. A not so evident irregular dark brown line separates the submarginal area from the postdiscal area. A little white discal spot is present. The underside ground colour of both wings is yellowish beige.

Male genitalia (Fig. 4a): The general structure of the male genitalia is in one way similar to that of *P. antioquia*. The male genitalia of this new species differs from that *P. yourii* in having the sclerotized and downwards turned uncus more elongated. In a ventral view, the shape of the valva with the sclerotized inner spine is elongated as in *P. zamora* Racheli & Racheli, sp. n. and in *P. antioquia*. The apical part of the sacculus (sensu LEMAIRE, 1971: fig. 22), near the apical process (not shown in Fig. 4a), has a projection not found in all the other species. As in *P. zamora* Racheli & Racheli, sp. n., the central part of the subtrapezoidal gnathos is medially concave forming a little flat 'V'. At its base, the gnathos is more sclerotized than that of *P. zamora* Racheli & Racheli, sp. n. The juxta is concave like a large 'U' and it is similar to that found in *P. antioquia*. The saccus is similar to that of *P. zamora* but it is not as straight and elongated as in the latter.

Female: Unknown.

Derivatio nominis: From Zamora Chinchipe, the Ecuadorian province where this new species has been collected.

Comments: According to the external morphology, this new species is very similar to *P. yourii* de-

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scribed by LEMAIRE (1985) from Napo and Morona-Santiago provinces, Ecuador (see also LEMAIRE & VENEDICTOFF, 1989; LEMAIRE, 2002). It differs from *P. yourii* (see LEMAIRE, 2002: pl. 71) in having a less elongated shape of the forewing, for the upperside ground colour of both wings and also in the colour of the marginal and submarginal lines of the hindwing upperside.

On the underside, the yellowish beige ground colour is very similar in both species. Few differences can be noticed in the irregular black line of both wings which separates the discal from the post-discal area. Indeed, the new species shows a well-marked straight line on the forewing while the same line is completely irregular in *P. yourii*. On the other hand, the male genitalia of *P. chinchipensis* Racheli & Racheli, sp. n. are more similar to those of *P. antioquia* and *P. sanmartini* Racheli & Racheli, sp. n. than to those of *P. yourii*.

LEMAIRE (1985) described *P. yourii* on the basis of two males (including the holotype) and one female. The two males are from Napo province while the female is from Morona-Santiago province. Given the present description of two new species from the province of Zamora Chinchipe, there is the possibility that the identification of the female specimen (allotype) designated by LEMAIRE (1985) in respect to *P. yourii* may not be correct. Indeed the allotype of *P. yourii* (see LEMAIRE, 1985: fig. 2) is clearly different from the female figured by LEMAIRE (2002: pl. 71, fig. 10). In any case, this remains a secondary problem and further field expeditions to Morona-Santiago and Zamora Chinchipe provinces will hopefully solve this problem in the future.

***Pseudautomeris sanmartini* Racheli & Racheli, sp. n.**

*Pseudautomeris ?antioquia* Lemaire, 2002

Holotype ♂ (Fig. 2): /Nord Perou, San Martín, Rte Olmos, Tarapoto k. 386, env. Progreso, 1800 m. 10-12-I-1980, T. Porion [leg.], [hand written]/; Genit. Prep., L. Racheli, N.-Code: PE7/; The holotype is deposited in coll. CL, in MNHN.

Paratypes: 1 ♂, /same data as the holotype/; *Pseudautomeris*, genit. male, prep. C. Lemaire, 3857 [hand written] /; in coll. CL, in MNHN.

Description: Forewing length, 42 mm. Head brown. Antennae brown. Legs brown. Thorax: upperside brown, underside brown and light brown. Abdomen: upperside of the same brown colour of the forewing. Anal tuft yellowish beige. Underside brownish beige.

Forewing upperside ground colour brown with a dark brown line which separates the basal area from the discal one. The brown marginal and submarginal areas are darker if compared with the basal and discal areas. A postmedial dark brown line extends from the apex to the inner margin. A conspicuous brown discal spot is present in the discal cell and it is surrounded by a very narrow yellow line.

Hindwing upperside entirely dull reddish coloured, and with a narrow reddish brown line which separates the marginal area from the submarginal. The submarginal and postdiscal areas are separated by an irregular large reddish line and by a second irregular narrow black brown line. The costa is the same colour as the ground colour of the upperside forewing. The eyespot is surrounded by a yellow line and by a second larger black line. The ground colour of the eyespot is grey with two very narrow yellow lines. Within the eyespot, the pupil is characterized by a narrow white bow.

On the underside of forewing, an irregular black postmedial line from the costa to the inner margin is evident. The discal spot is black with a white spot in the centre. The hindwing shows the same general features as in the forewing. An irregular dark brown line separates the submarginal area from the postdiscal area. A black and white discal spot is present. The underside ground colour of both wings is yellowish beige.

Genitalia (Fig. 4b): The structure of the male genitalia of this new species is related to that of *P. pohli* but smaller. It differs from *antioquia* in the less elongate shape of the valva, and in particular in having the apical process not developed and elongated as in *antioquia*. In a ventral view, the position of the inner spine tends to be turned inwards. The shape of the base of the inner spine (not shown in the Fig. 4b) is narrow while it is larger in *antioquia*. The uncus is similar to that of *antioquia* but less elongated.

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gated. The gnathos is medially concave in a 'U'-like shape. The vinculum is not shaped externally as in *antioquia*. Only the juxta and the saccus are similar in both species.

Female: Unknown.

Derivatio nominis: From San Martín, the Peruvian department where this new species has been collected.

Comments: The description of this new species is based on two male specimens only. The holotype here designated was figured by LEMAIRE (2002: pl. 71, fig. 8) who tentatively assigned it to *P. antioquia*. LEMAIRE (2002) stated that these two specimens could be related to a geographical variation of *antioquia*. The differences of the male genitalia among these two species discredit his statement.

Comparisons of the male genitalia of this new species with those of its relatives (*antioquia*, *pohli*, *boettgeri*, and the two new species described here), imply that this new species is apparently not related to them. According to the present knowledge and the recognition of the *salmonia* species-group (sensu LEMAIRE, 2002), it is obvious that *P. sanmartini* sp. n. belongs to this group but its relationship with the remaining species remains unclear.

***Pseudautomeris zamora* Racheli & Racheli, sp. n.**

*Pseudautomeris* sp. Racheli & Racheli, 2005

Holotype ♂ (Fig. 3): / Ecuador, Zamora-Chinchi, Río San Francisco, Estación Científica San Francisco, T2-6 (13), 2290 m, 3° 59' S 79° 04' W, 5-V-1999, LF V, 20.30-21.00 h, G. Brehm & D. Süssbach leg. / SMNS – Lep. 1999 – 15. / Genit. Prep., L. Racheli, N.-Code: PE8/ The holotype is deposited in SMNS.

Paratypes 10 ♂♂ in total: 1 ♂, Ecuador, Zamora-Chinchi, Río San Francisco, Estación Científica San Francisco, T2-5 (12), 2180 m, 3° 58' S 79° 04' W, 5-V-1999, LF III, 19.30-20.00 h, G. Brehm & D. Süssbach leg. / SMNS – Lep. 1999 – 15. / Genit. prep. L. Racheli, N.-Code: PE2; 1 ♂, Ecuador, Zamora-Chinchi, Río San Francisco, Estación Científica San Francisco, T2-5 (12), 2180 m, 3° 58' S 79° 04' W, 12-V-1999, LF II, 19.00-19.30 h, G. Brehm & D. Süssbach leg. / SMNS – Lep. 1999 – 15; 1 ♂, Ecuador, Zamora-Chinchi, Río San Francisco, Estación Científica San Francisco, T1-6 (6), 2308 m, 3° 59' S 79° 04' W, 9-V-1999, LF II, 19.00-19.30 h, G. Brehm & D. Süssbach leg. / SMNS – Lep. 1999 – 15; 6 ♂♂, Ecuador, Zamora-Chinchi, Río San Francisco, Estación Científica San Francisco, T2-7 (14), 2387 m, 3° 59' S 79° 04' W, 6-V-1999, LF III, 19.00-19.30 h, G. Brehm & D. Süssbach leg. / SMNS – Lep. 1999 – 15. / 1 ♂, same data of the latter specimen except for 19.30-20.00 h / Genit. prep. L. Racheli, N.-Code: PE4. All these paratypes are deposited in SMNS.

Description: Forewing length, 42 mm. Head brown. Antennae light brown. Legs brown, yellowish, beige. Thorax: upperside brown, underside brown and light brown. The upperside area between the thorax and the abdomen is covered by a reddish pink suffusion of the same ground colour as the hindwing upperside. Abdomen: upperside black with yellow rings, underside brownish and beige.

Forewing upperside ground colour brown with a yellowish beige line dividing the basal from the discal areas. A postmedial dark brown line extends from the apex to the inner margin. The same line is also characterized by the presence of black and yellowish-beige colours. Along this line and in particular at each vein intersection, there are whitish grey dots. The discal spot is dark brown with the presence of whitish grey dots along its margin.

Hindwing upperside entirely reddish pink coloured with a reddish brown line which divides the margin from the submarginal area. The submarginal and postdiscal areas are separated by an irregular large reddish line and by a second irregular narrow almost black dark brown line. The costa is brown, of the same colour as the forewing upperside. The eyespot is surrounded by a yellow line and by a second larger black line. The ground colour of the eyespot is grey with two yellow lines. Within the eyespot, the pupil is characterized by a narrow white half-moon.

On the underside of the forewing the margin is black and an irregular black line from the costa to the inner margin separates the discal area from the postdiscal. The discal spot is black. The hindwing shows the same general features as in the forewing. A faint, irregular dark brown line separates the sub-

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marginal area from the postdiscal. A black discal spot is present with a whitish dot in the center. The underside ground colour of both wings is yellowish beige.

Genitalia (Fig. 4c): The structure of the male genitalia of this new species is related to that of *P. antioquia* but it is smaller, as a whole. In detail, the structure is similar to that of *antioquia* as figured by Lemaire (2002: 74, fig. 1) but the saccus is elongated as in *P. pohli*. The uncus is elongated, sclerotized and, at the apex, turned downwards as in *antioquia*. The central part of the gnathos is medially concave shaping a little flat 'V' which is very similar to that found in *P. pohli*. The valvae are elongated as in *P. antioquia* with the apical process and the sclerotized inner spine turned ventrally. Although the shape of the valva is somewhat similar to that of *pohli*, the posterior part of the apical process is very elongated. This feature has previously only been found in *antioquia*. The juxta is medially concave and the shape is very similar to that of *pohli*.

Female: Unknown.

Derivatio nominis: From Zamora Chinchipe, the Ecuadorian province where this new species has been collected.

Comments: The description of this new species was delayed for a long time while waiting for the description of *Pseudautomeris boettgeri* by NAUMANN et al. (2005). Although we had the opportunity to examine a photo of *P. boettgeri* before its publication, it was not enough to elucidate our doubts about the identification of the specimens here described as *P. zamora*. Subsequently, the comparisons of specimens of both species confirmed some main differences in the external patterns.

### Conclusion

LEMAIRE (2002: 599), in his introduction of the genus *Pseudautomeris*, argued about the stability in the taxonomy of this genus because only two species had been described since the description of the genus itself. The recent description of a new species by NAUMANN et al., (2005) and the three new ones described here mirror the still scarce knowledge of the species belonging to this genus.

The description of these new species is the first step towards further studies aimed at understanding their relationships and their systematic position. As stated also in the introduction, the same recognition of the species-group *salmonia* (sensu LEMAIRE, 2002) seems to be an artificial arrangement in agreement with the statement of NAUMANN et al., (2005).

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We are grateful to Christopher L. Häuser (Staatliches Museum für Naturkunde, Stuttgart, Germany) and to Joël Minet (Muséum National d'Histoire Naturelle, Paris, France) for their hospitality and constructive assistance during our visits to the Museums mentioned above. Special thanks are due to Rodolphe Rougerie who kindly spent his time helping the senior author in the examination of the collection of Claude Lemaire (in MNHN). Thanks are due also to Niccolò Falchi for the drawings of the male genitalia of these new species. Bernhard Wenzel, Stefan Naumann and Ulrich Brosch were very helpful on many occasions in particular with information on *P. boettgeri*.

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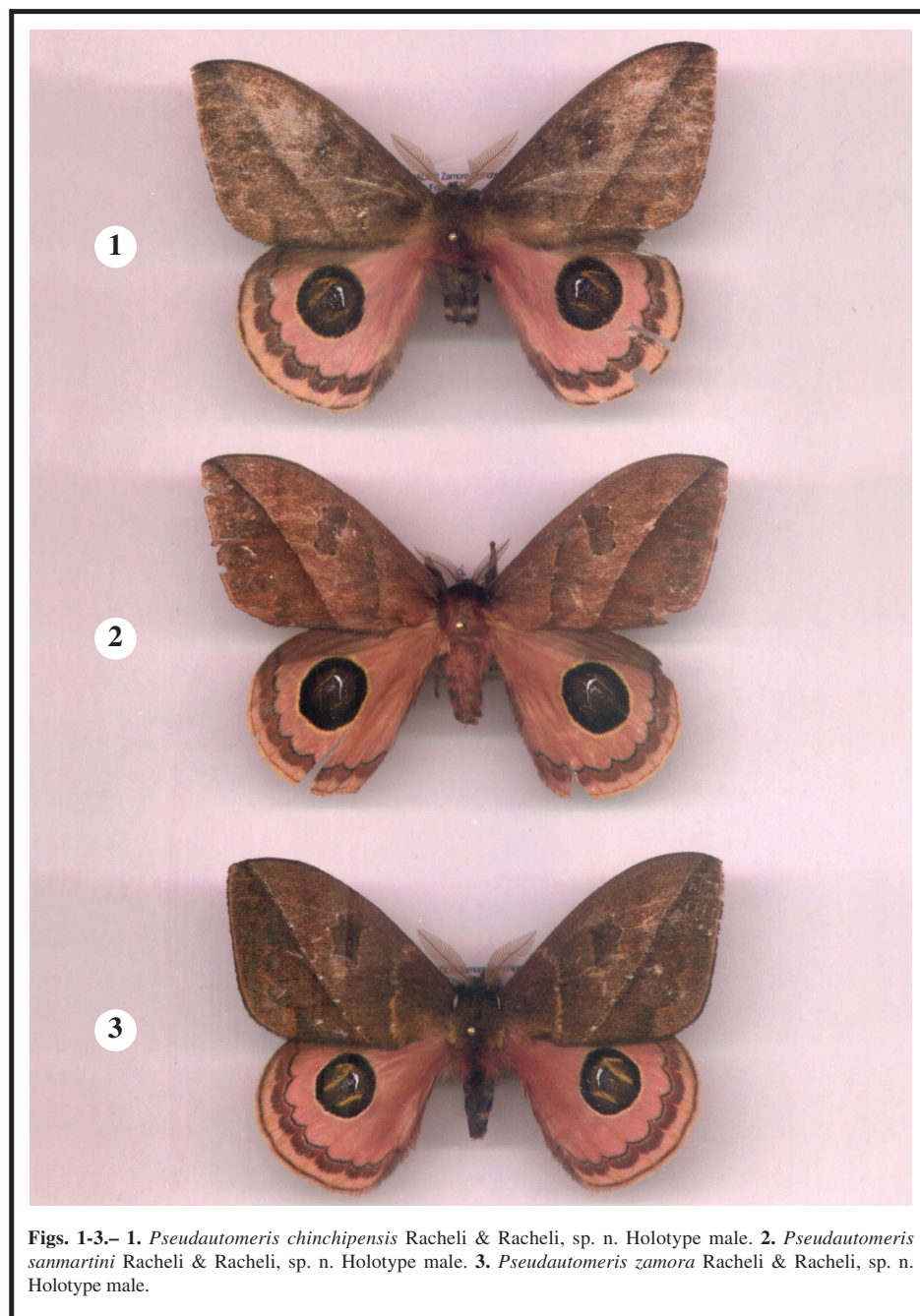
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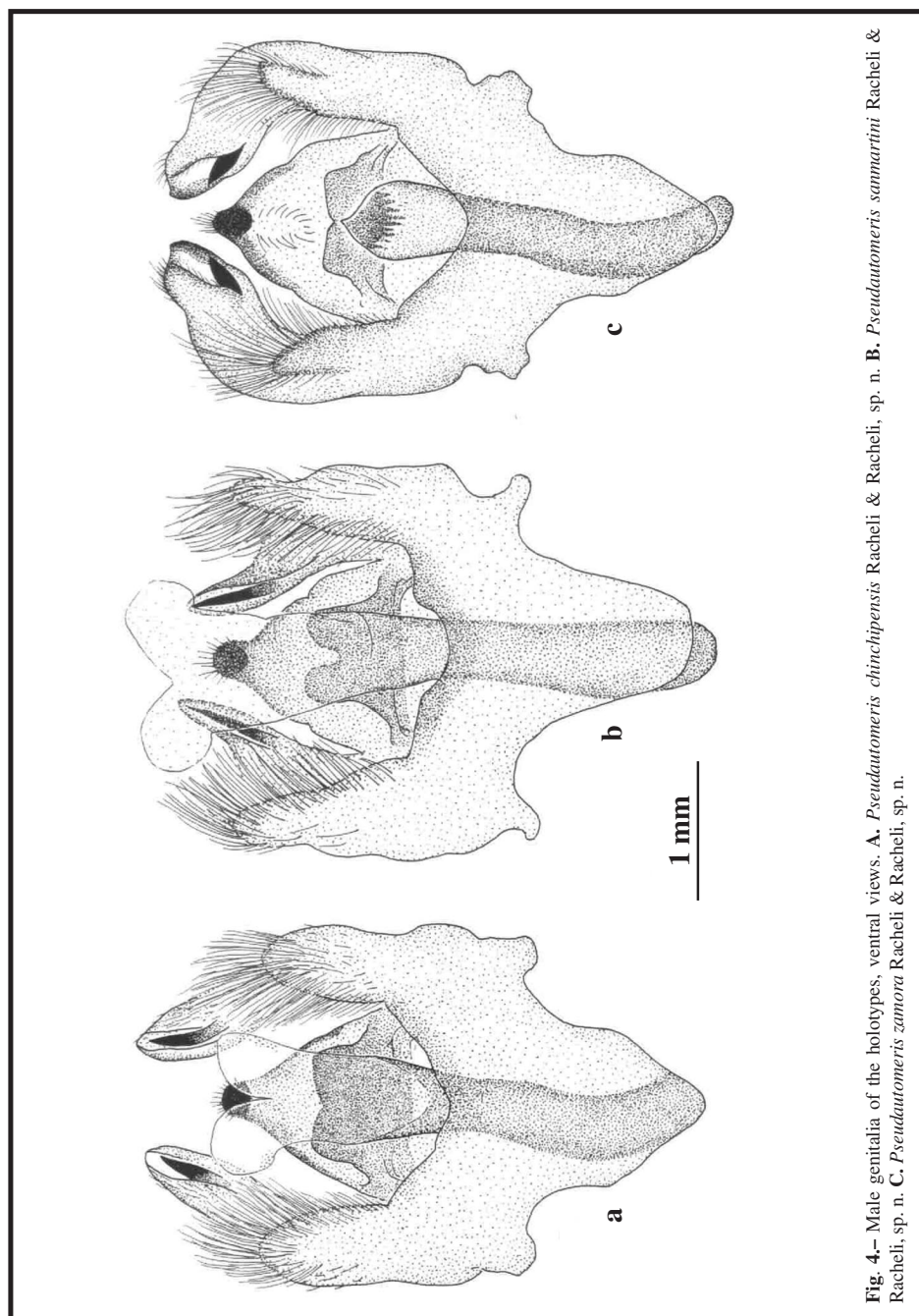


Fig. 4.- Male genitalia of the holotypes, ventral views. **A.** *Pseudautomeris clinchipsensis* Racheli & Racheli, sp. n. **B.** *Pseudautomeris sammartini* Racheli & Racheli, sp. n. **C.** *Pseudautomeris zamora* Racheli & Racheli, sp. n.